This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XVI. 1 APRIL, 1953 No. 4

Soil Fertility Investigations

Results of the 1952 Season

By L. G. VALLANCE

A large number of fertilizer trials of several types were harvested during the season. In the early stages of growth in many areas, growing conditions were not particularly good, but these improved considerably before harvest and, in general, well grown cane was present on the majority of trials. The experiments with mixed fertilizers again indicated the necessity for the application of sulphate of ammonia and muriate of potash. This latter plant nutrient is becoming increasingly important in most sugar producing districts and fertilizer mixtures containing adequate amounts of potash are essential for planting and ratooning.

Over the years there has been a tendency on the part of many growers to consider that a planting mixture is one which contained a high proportion of superphosphate and a low percentage of potash. In the early days, this was undoubtedly the case on a great many of the soil types. Actually, twenty to thirty years ago most of our soils were reasonably well supplied with potash (with the exception of red volcanic loams) but they required the addition of substantial amounts of superphosphate. Farmers were quick to appreciate this and so the practice of using high phosphate mixtures for planting became a general one. However, under continuous cultivation, soil conditions are not static and the fertilizing methods which were satisfactory originally, quite possibly require altering in the light of changing conditions. Growers are strongly advised to give some thought to these facts before making their fertilizer purchases.

An indication of the necessity to be certain that sufficient potash is used in planting and ratooning mixtures is provided by the large number of soil analyses carried out during 1952. It will be seen from the following figures that out of 905 fertilizer recommendations based on the analyses of soils from farmers' properties only 91 or about 10 per cent. required Sugar Bureau No. 1 Mixture. Over half of the samples required Sugar Bureau No. 2 Mixture, while nearly one-third required the high amount of potash

contained in Sugar Bureau No. 3 Mixture.

Type of Fertilizer Required	Number of Soils Analysed
Sugar Bureau Mixture No. 1	91
Sugar Bureau Mixture No. 2	482
Sugar Bureau Mixture No. 3	332
Total	905

It will be recalled that:—

Sugar Bureau Mixture No. 1 (**Planting** or **Ratooning**) contains a high percentage of phosphate and low potash.

Sugar Bureau Mixture No. 2 (**Planting** or **Ratooning**) contains moderate and approximately equal amounts of phosphate and potash.

Sugar Bureau Mixture No. 3 (**Planting** or **Ratooning**) contains a low percentage of phosphate and a high amount of potash.

The Bureau is again grateful to those growers on whose properties the following trials were carried out. The co-operation of Messrs. A.C.F. & Shirleys Fertilizers Ltd., who were good enough to supply fertilizer free of charge, is also greatly appreciated.

FERTILIZER TRIALS

Messrs. ROBINO BROS.' FARM, Babinda.

Soil type: Granite gravel.

Age of crop: 12 months.

Nature of crop: First ratoon (Trojan).

Harvested: November, 1952.

After the plant crop was harvested the cane was ratooned in November. It came away evenly and well. As with the plant crop, the plots receiving sulphate of ammonia soon showed superior growth, but again there was no response to superphosphate.

The application of potash to the plant crop had not given any beneficial results and a somewhat similar state of affairs occurred in the first ratoon. In this latter crop, however, there was a slight tendency for heavier yields to occur in the plots which had received the highest amount of potash. Although this was not very well marked it probably indicated that it would not be wise to omit potash fertilizer from the succeeding crops.

In general, insofar as phosphate and potash are concerned it is evident that the soil is reasonably well supplied and therefore a fertilizer mixture such as Sugar Bureau No. 2 would be most suitable. This mixture contains moderate quantities of these two plant foods and its application in light amounts, *i.e.*, about 2-2½ cwt. per acre would prevent the soil from becoming depleted in phosphate and potash.

The application of sulphate of ammonia increased the yields considerably, and an appreciable response occurred in both plant and ratoon crops with the 200 lb. and also the 400 lb. dressing. This is shown by the following figures—

Sulphate of ammonia lb. per acre	Yield of sugar, tons per acre		
	Plant crop	First ratoon	Total
nil	5.32	3.72	9.04
200	5.62	4.30	9.92
400	5.88	5.44	11.32

It will be seen that the top-dressing of sulphate of ammonia of 2½ bags (400 lb.) per acre which was given to the plant cane and also to the first ratoon brought about a total yield of 11.32 tons of sugar per acre over the two crops. This increase, which was about 2¼ tons of sugar per acre greater than that of the area receiving no top-dressing, amply repaid the cost of the fertilizer and the extra cost of harvesting the heavier crop. The lighter dressing (200 lb. per acre) was also responsible for an appreciable increase

in yield of sugar, but was not sufficient to produce the maximum yield of cane and sugar.

If we consider the effect of the sulphate of ammonia on the two crops individually, it is very noticeable that a much greater response (1.72 tons of sugar) was obtained from the heavier dressing on the ratoon crop than on the plant crop (.56 tons of sugar). Actually in the plant crop the additional crop due to the 200 lb. dressing was nearly as great as that resulting from the 400 lb. application.

Mr. G. FORMILAN'S FARM, Mundoo.

Soil Type: Red volcanic.

Age of crop: 11 months.

Nature of crop: First ratoon (H.Q.426).

Harvested: July, 1952.

Conditions throughout the life of the crop were favourable for good growth. Whilst regular rainfall provided ample soil moisture, the wet season was not heavy and waterlogging did not occur. The cane was kept well worked and clean. It was erect when harvested. The response to potash was quite evident from the appearance of the cane. Nitrogen appeared to encourage growth somewhat spasmodically and the plots receiving sulphate of ammonia were generally superior to those which were not so treated. At no time was there any apparent response to superphosphate. When the plots were harvested the field observations were confirmed by the yield weights.

Since superphosphate had no effect on yields in either plant or ratoon crop, the figures for sulphate of ammonia and muriate of potash only, are given herewith:—

Fertilizer applied per acre	Yield of cane, tons per acre		
	Plant crop	First ratoon	Total
No sulphate of ammonia ..	23.94	19.81	43.75
200 lb. sulphate of ammonia	22.33	20.46	42.79
400 lb. sulphate of ammonia	22.78	20.91	43.69
No muriate of potash ..	21.26	14.30	35.56
120 lb. muriate of potash ..	21.90	20.65	42.55
240 lb. muriate of potash ..	25.90	26.23	52.13

Response to sulphate of ammonia—Red volcanic soils, particularly where a green manure crop has been ploughed in, very seldom show any necessity for sulphate of ammonia application to the plant cane. The figures above indicate this. The response in the first ratoons was not very definite, but there are slight indications that nitrogen is beginning to be required. This tendency would, no doubt, be more noticeable in the second ratoon crop.

Response to muriate of potash—Again this trial illustrates a typical characteristic of red volcanic soils, *i.e.*, the need for adequate application of potash to both plant and ratoons. Over the two crops the heavier application of potash was responsible for increasing yields by nearly 17 tons per acre. As might be expected, the effect was greater in the second crop than in the first.

Sugar Bureau Mixture No. 3 at the rate of 5 cwt. per acre to plant and ratoon cane would provide a suitable fertilizing programme for this soil. It would be advisable to apply sulphate of ammonia as a top dressing to ratoons at the rate of about two bags per acre. For plant cane on land which had not been green manured, we would suggest a light top dressing of sulphate of ammonia at the rate of one bag per acre to guard against any possible nitrogen deficiency from unforseen causes, such as the ploughing in of a heavy growth of grass and weeds.

Mr. F. DARVENIZA'S FARM, South Johnstone.

Soil type: Red volcanic.

Age of crop: 15 months.

Nature of crop: Plant cane (Badila).

Harvested: August, 1952.

The results of this trial indicate the value of soil analysis and point out that very often a great deal of money may be saved by using it as a means of estimating the fertilizer requirement of the soil. In many parts of the Innisfail district heavy applications of fertilizer have been common practice for a number of years, with the result that an appreciable reserve of plant food has been built up within the soil. Whilst there is undoubtedly some merit in such a practice, it can be overdone, particularly when such costly material is involved.

The soil analysis of the trial area indicated that no phosphate and potash would be required. Because of the good green manure crop that was ploughed in prior to planting, it was most unlikely that any sulphate of ammonia would be necessary for the plant crop on this red volcanic soil.

The figures show that no significant differences occurred between the treatments and that the heaviest application of 8 cwts. of mixture plus 2 cwt. of sulphate of ammonia gave no better results than 4 cwt. of mixture with no top dressing. The former heavy fertilizer application is by no means uncommon in the district. Under some remote circumstances, it may be justified, but whether it is required may be readily determined by a soil test.

In this present instance the difference in cost between the highest and lowest applications is in the vicinity of £10 per acre. Over a large acreage this would amount to a considerable sum, the expenditure of which could undoubtedly be avoided.

The following are the treatments which were used and the resulting yields in tons of sugar per acre:—

Fertilizer, per acre	Yields, tons of sugar per acre
1. 4 cwts. Sugar Bureau Mixture No. 2 ..	6.75
2. 4 cwt. Sugar Bureau Mixture No. 2 plus 2 cwt. Sulphate of Ammonia	6.62
3. 6 cwt. Sugar Bureau Mixture No. 2	6.85
4. 6 cwt. Sugar Bureau Mixture No. 2 plus 2 cwt. Sulphate of Ammonia	6.77
5. 8 cwt. Sugar Bureau Mixture No. 2 ..	6.86
6. 8 cwt. Sugar Bureau Mixture No. 2 plus 2 cwt. Sulphate of Ammonia	6.61

It is also felt that the lowest application, *i.e.*, 4 cwt. of mixture per acre, was unnecessary for the present crop. However, it is a wise precaution to use even a light dressing of mixture at planting or ratooning in order to replace the plant foods which will be taken out of the soil by the growing cane. In times of dry weather also, the presence of a supply of nutrients in the moist soil below the stool is a desirable feature. Usually an application of 2-2½ cwt. is sufficient for this purpose, and had this been used in the trial an even greater saving would have been evident.

ESTATE OF A. E. KELLY & SONS' FARM, North Isis.

Soil type: Red volcanic loam.

Age of crop: 15½ months.

Nature of crop: Second ratoon (Q.50).

Harvested: December, 1952.

After the previous crop was harvested in August, 1951, ratooning was even but very slow due to dry weather. By the end of the year the cane had made little growth and was suffering severely from drought. However, rain

in mid-January saved the crop and when cut late in 1952 reasonable yields were obtained.

As for the two previous crops, this second ratoon showed marked benefit from sulphate of ammonia and muriate of potash, but no response to superphosphate. The yields of the plant, first and second ratoon crops are as follows:

Fertilizer applied per acre	Tons sugar per acre			
	Plant	First ratoon	Second ratoon	Total
No sulphate of ammonia	5.79	2.27	2.19	10.25
160 lb. sulphate of ammonia	6.18	3.00	2.83	12.01
320 lb. sulphate of ammonia	6.43	3.42	2.91	12.76
No superphosphate	6.14	2.83	2.63	11.60
200 lb. superphosphate	6.24	2.94	2.64	11.82
400 lb. superphosphate	6.03	2.93	2.66	11.62
No muriate of potash	6.06	2.64	2.04	10.74
180 lb. muriate of potash	6.02	2.90	2.76	11.68
360 lb. muriate of potash	6.32	3.15	3.13	12.60

Sulphate of ammonia—In all three crops sulphate of ammonia increased the yield of sugar, resulting in a total increment of 2.51 tons of sugar. This excellent response readily offset the cost of the annual dressing of two bags (320 lb.) of sulphate of ammonia per acre.

Muriate of potash—The response to potash was not very well marked in the plant crop. This was probably due to the presence of some residual material from previous fertilizer applications. However, this was only a temporary effect and the ratoon crops indicated the necessity for using a mixture containing an adequate percentage of potash.

A suitable fertilizer mixture at planting and ratooning for this soil would be Sugar Bureau Mixture No. 3, which contains high potash. An adequate top dressing of sulphate of ammonia would also be necessary.

Mr. V. SUOSAARI'S FARM, Bli Bli, Nambour.

Soil type: Brown alluvial clay loam.

Nature of crop: First ratoon (Q.50).

Age of crop: 12 months.

Harvested: November, 1952.

The plant crop of this trial showed a very good response to sulphate of ammonia, a slight and somewhat indefinite response to potash and no benefit from superphosphate. In general these results were repeated in the first ratoon crop, and for comparison purposes the figures for both harvests are given on the following page.

It will be seen that the application of sulphate of ammonia brought about a large increase in yield amounting to about 11½ tons of cane over both crops; moreover, the lighter dressing (200 lb. per acre) gave practically as good results as the heavier dressing of 400 lb. per acre. Superphosphate did not increase the yield and it is evident that a fertilizer mixture containing only a small percentage of this material is required. Such a precaution is necessary to avoid depleting the soil of phosphate and it is advisable to replace that which has been taken out by the growing crop.

As in the case of the plant crop, muriate of potash did not greatly improve the yield of the first ratoon.

Over the both crops, this fertilizer was responsible for an increase of about 4½ tons of cane per acre. It is evident, therefore, that the fertilizer mixture should contain some potash, but the application of very heavy amounts would not be an economical proposition.

Fertilizer applied per acre	Tons Cane per acre		
	Plant	First ratoon	Total
No sulphate of ammonia ..	14.07	28.11	42.18
200 lb. sulphate of ammonia	21.28	31.45	52.73
400 lb. sulphate of ammonia	22.28	31.45	53.73
No superphospate	20.06	28.21	48.27
200 lb. superphosphate ...	19.53	30.13	49.66
400 lb. superphosphate ..	18.03	28.41	46.44
No muriate of potash ..	18.56	27.82	46.38
120 lb. muriate of potash ..	18.57	28.59	47.16
240 lb. muriate of potash ..	20.50	30.33	50.83

SULPHATE OF AMMONIA—RATOON CANE TRIALS.

It is now widely recognised by cane farmers that sulphate of ammonia is a most important fertilizer. There are very few areas which do not need adequate applications to produce maximum crops. This is particularly true of ratoons which are more demanding in their requirements of nitrogen than plant cane. The green manure crops which are ploughed in prior to planting are, in the majority of cases, quite capable of supplying all the nitrogen required for the first crop. Moreover, the fallow period or spelling of the land that occurs between the conclusion of the final ratoon and replanting allows a build-up of available nitrogen to take place in most sugar cane soils. Ratoon cane, however, is not so advantageously placed since it immediately follows a more or less heavy crop which has had a most exhausting effect on the nitrogen which the soil is able to supply. Therefore there is no alternative but to apply the required nitrogen in the form of fertilizer.

The normal procedure is to use a ratooning mixture which in addition to superphosphate and muriate of potash contains a certain amount of sulphate of ammonia. This is applied when the cane is being ratooned, *i.e.*, shortly after the previous crop has been harvested, but the bulk of the sulphate of ammonia is applied as a separate top dressing some time later, usually about the end of the year. For plant cane, this separate top dressing has much to commend it, since a large concentration of sulphate of ammonia around the germinating sett is most undesirable and may kill the eye.

In some districts also, the application of sulphate of ammonia shortly after harvest, particularly when the cane has been cut early in the crushing season, can be definitely inadvisable. Depending upon weather conditions it may encourage a very vigorous early growth prior to the spring months. In those areas where low rainfall and hot drying winds are prevalent in spring and early summer, cane with lush foliage receives a very severe set-back. When the summer rains and good growing weather arrives, the sulphate of ammonia, which has been applied several months earlier, may no longer be present, and therefore is unable to encourage the crop to take best advantage of its normal growing seasonal conditions.

Of course if the weather is such that good growing conditions are maintained following a warm open winter then it is possible that the application of the top dressing at ratooning would induce early growth which would be continued without a check. Such conditions prevail very frequently in the Innisfail area, and indeed in many parts of North Queensland. For this reason a series of trials are being conducted in the South Johnstone-Mourilyan districts to determine whether the sulphate of ammonia may be successfully combined with the ratooning mixture.

The results of the two trials harvested last year are given below:—

Mr. B. DALLA VECCHIA'S FARM, South Johnstone.

Soil type: Red volcanic loam.

Age of crop: 12 months.

Nature of crop: First ratoon (Pindar).

Harvested: October, 1952.

After harvesting the field was fertilized uniformly with superphosphate and muriate of potash in order to ensure that no deficiencies in this respect would occur.

The crop averaged over 43 tons per acre with an average c.c.s. of 16.1. The various treatments and corresponding yields are as follows:—

Amount of sulphate of ammonia applied per acre	Yields, tons sugar per acre	
	Applied 18th October (at ratooning)	Applied 4th December
300	7.0	6.8
600	7.0	7.0

As will be seen, there were no differences in the yields and the cane which had the sulphate of ammonia applied at ratooning in October produced the same amount of sugar as that which was top dressed in December. The low value of 6.8 is due to a slight variation in the plots and does not indicate a real drop due to treatment. It is also apparent that on this red volcanic soil an application of 600 lb. of sulphate of ammonia did not produce a better crop than half the amount, *i.e.*, 300 lb. per acre. The c.c.s. figures for all treatments were similar, indicating that the various applications did not affect the sugar content one way or the other.

Mr. E. P. EDGERTON'S FARM, Mourilyan.

Soil type: Reddish-brown schist loam.

Age of crop: 10 months.

Nature of crop: First ratoon (Pindar).

Harvested: August, 1952.

The method adopted for this trial was the same as that described above for the experiment on Mr. Dalla Vecchia's farm. It should be noted, however, that in this case the soil was a reddish-brown schist loam and not red volcanic. Although ratooned at approximately the same time (October) it was harvested two months earlier. The results of this trial are as follows:—

Amount of sulphate of ammonia applied per acre	Yield, tons sugar per acre	
	Applied 10th October (at ratooning)	Applied 4th December
300 lb.	5.4	5.2
600 lb.	6.1	5.7

This schist soil has quite definitely shown a marked response to the heavier dressing of sulphate of ammonia, for the figures indicate that the 600 lbs. per acre produced more sugar irrespective of whether it was applied at ratooning in October or later in December. In this respect the results are different to those obtained in the similar trial carried out on the red volcanic soil.

It is also evident that better yields were achieved when the sulphate of ammonia was applied in October instead of the more usual time at the end of the year. This occurred in both the heavy and the light dressings, although the effect was more noticeable in the former case.

These trials have produced most interesting results and it would appear that, in these districts the ratooning mixture plus the top dressing could, with advantage, be applied as a combined application in the one operation at ratooning. Further trials of a similar nature are in progress to determine whether this will hold good in the majority of cases.

LIME TRIALS

It may be recalled that last year the plant crop results of a series of lime trials were recorded in the April issue of the Quarterly Bulletin. It was then pointed out that out of 17 trials set out, 14 of them showed an increased crop on the plots which were treated with lime. These increases were slight and in some cases rather indefinite.

The first ratoons of these trials have now been harvested and their results follow very closely those of the plant cane. No very large increases were obtained from the application of lime, but although the benefit obtained was sometimes too small to be significant the yields obtained from the limed plots were consistently higher than those from the plots which had not received lime.

Four treatments were used and these are as follows:—

1. Two tons of agricultural lime per acre broadcast evenly over the whole area.
2. Ten cwt. of agricultural lime per acre applied in a band to the cane drill only.
3. Five cwt. of agricultural lime per acre applied in a band to the cane drill only.
4. No lime.

The average yield results on a district basis are shown in the accompanying table:—

Treatments per acre	District Averages (tons cane per acre)			
	Cairns (5 trials)	Innisfail (5 trials)	Mackay (4 trials)	Bundaberg (3 trials)
2 tons lime broadcast	23.64	37.61	23.42	36.89
10 cwt. lime in drill	24.58	37.61	22.76	37.22
5 cwt. lime in drill	23.23	37.76	22.09	35.84
No lime	23.06	36.40	21.82	36.82

In considering these 17 replicated trials individually it may be pointed out that in 16 of them either the two tons broadcast or the 10 cwt. drill application gave better results than the unlimed plots. Moreover, it would appear that the latter application was equally as beneficial as the two tons broadcast. This is a most interesting development and one which could have considerable practical value. The normal liming procedure on the cane farm is to broadcast a dressing of two tons per acre, and this becomes an expensive item when large acreages are to be treated. However, if the amount could be cut down to 10 cwt. per acre by dressing the row area only, an appreciable reduction in expenditure would result.

In order to observe the further behaviour of the various treatments these trials will now be taken to the second ratoon crop, wherever possible.

LIME TRIALS—NAMBOUR DISTRICT

Mr. J. J. TOOMEY'S FARM, Maroochy River.

Soil type: Alluvial clay loam.

Nature of crop: Plant cane (Q.50).

Age of crop: 14 months.

Harvested: November, 1952.

This trial which was set on a heavy alluvial soil in the Maroochy River area, was somewhat different to the foregoing series of lime trials in that heavier dressings of lime were used. The treatments together with the yield results are as follows:—

Treatments	Yield of cane tons per acre
3 tons lime per acre, broadcast	37.25
30 cwt. lime per acre, broadcast	35.38
15 cwt. lime per acre, broadcast	34.81
15 cwt. lime per acre, in drill ..	34.44
No lime	33.81

These yield figures indicate a decided beneficial response from the three ton broadcast application. The plots which received no lime produced the lowest yields and the 15 cwt. application which was applied as a band on the drill was inferior to all other liming treatments. This was somewhat unexpected in view of the efficacy of this latter method in the other series of lime trials. A point to be remembered, however, is that drainage is important in these Maroochy River alluvials and the heavy broadcast dressing of lime may have been of considerable benefit in this respect. The trial will now be continued in order to observe the effect of the various treatments on the ratoon crop.

Mr. K. J. GARRETT'S FARM, Bli Bli.

Soil type: Black silty loam.

Age of crop: 12 months.

Nature of crop: Plant cane (Q.47).

Harvested: October, 1952.

The various treatments in this trial were similar to those previously described for the experiment on Mr. Toomey's farm, *i.e.*,

1. Three tons agricultural lime per acre broadcast.
2. 30 cwt. agricultural lime per acre broadcast.
3. 15 cwt. agricultural lime per acre broadcast.
4. 15 cwt. agricultural lime per acre broadcast, applied as a band on the drill.
5. No lime.

When the crop was harvested there was not a great deal of difference between the yields from the various treatments. The three ton and 30 cwt. broadcast applications were the only ones which appeared to be better than the plots which received no lime; however, the results were rather too variable to allow any conclusions to be drawn at this stage. More definite results will most likely be obtained from the ratoon crop.

IRRIGATED LIME TRIAL

Mr. E. H. CHURCHWARD'S FARM, Gooburrum.

Soil type: grey sandy (forest).

Age of crop: 19 months.

Nature of crop: Plant cane (C.P.29/116).

Harvested: October, 1952.

The treatments applied and the results obtained from this lime trial which was carried out under irrigation are as follows:—

Treatment	Yield, tons cane per acre
2 tons lime per acre, broadcast..	53.19
10 cwt. lime per acre, in drill ..	52.00
5 cwt. lime per acre, in drill ..	50.38
No lime	49.19

The heavier dressings of lime appeared to have a beneficial effect, but the differences in yields between the plots were not quite large enough to allow a great deal of significance to be attached to the trends indicated. However, it is probable that these trends will show up more definitely in the ratoon crop.

Varietal Trials—1952 Season

By H. C. HASKEW

The cane growing season which recently concluded with such marked success began somewhat inauspiciously, for conditions in many areas were dry and much newly planted cane showed little headway. For the larger part of the season growth was sometimes slow and occasionally at a standstill, but ultimately tonnages obtained from the varietal trials were generally quite satisfactory and have enabled sound comparisons to be made between varieties. It is pointed out that these comparisons, and the recommendations based upon them, are most useful to the practical cane grower when they are obtained during a fair to good growing season.

This is an obvious truth to the grower who accepts as the basis of his planting arrangements the expectation of, at least, an average good season and so the varieties from which he must make his choice are preferably those producing most under such conditions. Also to be considered is the fact that the usefulness of a variety is further governed by its behaviour under conditions which may be regarded as unusual, but which occur sufficiently frequently to be taken into consideration, *i.e.*, bad cyclone seasons, extended monsoonal rains, heavy frosts, or severe droughts.

For this reason the testing of new seedlings is carried out as intensively as possible to ensure that a cane which behaves well under average circumstances is not overtaken by disaster when conditions depart from normal.

The results of the following trials indicate the extent of the varietal testing during the 1952 season. It will be seen that some of the new seedlings and at least one importation (N.Co.310) show promise.

LEONARDI & DI PALMA, Whyanbeel.

Soil Type: Alluvial grey clay.

Nature of crop: First ratoon.

Age of crop: 12 months.

Harvested: September, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.50	31.17	18.51	32.50	17.72	63.67	11.53
Comus ..	28.70	17.00	22.06	15.32	50.76	8.26
Pindar ..	27.49	18.62	28.38	17.12	55.87	9.98
Trojan ..	18.88	18.38	21.03	17.69	39.91	7.19
41 M.Q.779 ..	18.84	18.68	18.19	16.22	37.03	6.47

DISCUSSION.

Weather conditions were good at the time of ratooning this trial and all varieties came away satisfactorily with the exception of 41 M.Q. 779, which gave an irregular stand. Q.50 ratooned most vigorously of all.

Q.50 has led in cane and sugar production for both years of the crop, Pindar being the only variety to compete seriously with it. Trojan and 41 M.Q.779 have quite high c.c.s., but their tonnages are too low; the reverse holds for Comus. It is to be noted that Q.50, Pindar, and Trojan have shown slight increases in yield when compared with the plant crop.

W. H. CECIL, Miallo.

Soil type: Grey clay loam. **Nature of crop:** Plant.

Age of crop: 17 months. **Harvested:** October, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Comus	33.64	16.71	5.62
Pindar	33.45	16.38	5.48
Q.57..	27.76	16.39	4.55

DISCUSSION.

It is unfortunate that the Q.57 planting material was found to be unsuitable and this resulted in a germination rate of only 67 per cent., compared with 80 and 90 per cent. for Pindar and Comus respectively.

On the results that were obtained there is nothing to choose between Comus and Pindar, and these two varieties have each outyielded Q.57 in both cane and sugar per acre. The c.c.s. figure for Q.57 has, as would be expected, suffered no apparent effect from the low germination rate and its value lies between those for the other two. The relative worth of the three varieties may change in ratoons if Q.57 is able to give a more normal yield of cane.

AMADIO BROS., Highleigh.

Soil type: Brown alluvial silty loam. **Nature of crop:** Plant.

Age of crop: 12 months. **Harvested:** July, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.57	55.02	9.07	4.99
Trojan	54.50	9.69	5.28
Badila	48.22	8.09	3.90
G.208	48.02	8.68	4.17
Ragnar	45.12	10.44	4.71
H.231	41.90	9.62	4.03

DISCUSSION.

Germinations were rapid in all varieties except Trojan and Ragnar, which were satisfactory if slightly slower; G.208 gave only 75 per cent. germination. H.231 deserves mention as a cane which showed excellent early promise of a good stool, but much "crowding out" of sticks occurred and its final yield was consequently low.

It is unfortunate that this block had to be harvested early (July) as resulting c.c.s. figures were very low and do not indicate what figures might have been reached had harvest been later. For

this reason it is best not to draw any conclusion from the c.c.s. results. Judging the varieties in the trial on cane tonnages alone it is seen that Q.57 and Trojan have produced very nearly the same amounts. Badila, G.208 and Ragnar are also close together. H.231 produced rather poorly.

G. H. STAGER, Highleigh.

Soil type: Grey-brown schist. **Nature of crop:** Plant.

Age of crop: 14 months. **Harvested:** July, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Comus	32.12	11.71	3.76
Pindar	30.65	11.75	3.60
Q.50..	30.50	13.05	3.98
Q.57..	27.90	14.16	3.95
Cato..	25.75	14.91	3.84
H.231	20.35	14.74	3.00

DISCUSSION.

Germination was rapid after planting in May, 1951, but percentages were low in some varieties, due to pineapple disease. Q.50 and Q.57 were worst in germination rate and H.231 was only slightly better. Supplies to these three gave good growth. Conditions, later in 1952, were dry and Q.50 was the only variety to withstand them satisfactorily. Q.50, Comus and Pindar arrowed in May, 1952.

Comus, Pindar and Q.50 have produced most cane, but Q.50 is the only one of these with high c.c.s. and it, together with Q.57 and Cato, has produced most sugar. H.231 is the only variety whose sugar production is sufficiently different from the others to be significant; the difference means that H.231 could be generally expected to produce less sugar than any of the others.

NORTHERN SUGAR EXPERIMENT STATION, Gordonvale, Block A.3.

Soil type: Brown to grey clay loam. **Nature of crop:** Plant.

Age of crop: 15 months. **Harvested:** August, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
I.245	42.61	16.45	6.92
Trojan	38.68	17.06	6.60
I.235	38.48	17.46	6.72
I.222	36.10	16.69	5.90
H.360	25.93	17.20	4.45
H.231	25.80	17.98	4.64

DISCUSSION.

The block at the Experiment Station on which this trial was conducted shows a very large variation in soil fertility with corresponding effect on the varieties, and it was necessary to take this into account when judging the value of the yield figures.

H.231 and H.360 are very low in both cane and sugar; the poor soil and dry conditions early in the trial have no doubt both contributed to this result. There is very little to choose between the other four—I.222, I.235, I.245 and Trojan—on the plant crop alone and any one would be capable of taking the lead.

T. J. TREMBATH, Bartle Frere.

Soil type: Friable red volcanic loam. **Nature of crop:** First ratoon.

Age of crop: 11 months. **Harvested:** August, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
I.426	36.01	16.83	37.12	16.11	73.13	12.04
I.405	33.26	16.48	33.32	15.31	66.58	10.58
I.421	32.21	15.71	33.64	15.10	65.85	10.14
Badila ..	31.30	15.81	33.92	15.74	65.22	10.29

DISCUSSION.

Growth conditions were good during the ratoon crop of this trial and it is reasonable to expect that the reliability of the results will thereby have been increased.

On sugar production I.426 is best and has produced, in two crops, nearly 1½ tons more sugar per acre than its nearest competitor. This is the only new variety in the trial which has shown any significant difference from the standard, Badila. However, it is reasonably confirmed that I.405 and I.421 are at least as good as Badila.

R. J. & G. M. STEWART (late Mrs. E. M. Stewart), El Arish, Tully.

Soil type: Gravelly sand loam. **Nature of crop:** First ratoon.

Age of crop: 15 months. **Harvested:** October, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
41 M.Q.779 ..	35.58	16.81	31.51	16.50	67.09	11.18
41 M.Q.764 ..	34.20	15.20	27.57	14.91	61.77	9.31
Q.44	32.45	15.50	27.57	14.65	60.02	9.07
Trojan ..	30.76	15.90	28.38	15.68	59.14	9.34
Q.50	28.95	15.89	30.14	14.93	59.09	8.81
Pindar ..	28.32	17.30	33.14	14.94	61.46	9.85

DISCUSSION.

Good growing conditions from the time of harvest of the plant crop have enabled the area of the trial to be farmed well throughout the year and make possible a sound comparison of the relative merit of the varieties.

Pindar, which produced least cane in the plant crop, recovered sufficiently to produce most in first ratoons, though this production was not significantly higher than 41 M.Q.779. However, the latter variety has shown a fall in production in ratoons. Trojan has produced insufficient cane or sugar in this trial to compare with the previous two varieties and has also given a lower cane tonnage in ratoons. Q.50 and Q.44 both stooled well but lodged heavily and harvestable tonnages were low. 41 M.Q.764, being brittle and rat damaged, also lodged and its production fell badly.

LOWER BURDEKIN SUGAR EXPERIMENT STATION, Ayr, Block E.

Soil type: Brown silty loam.

Nature of crop: Plant.

Age of crop: 14 months.

Harvested: August, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
40 S.N.1133	66.08	13.42	8.87
Q.57	58.60	15.19	8.90
B.331	54.68	14.52	7.94
G.324	53.90	12.36	6.66
G.208	50.60	15.24	7.71
S.J.16	46.55	15.92	7.41
G.237	45.90	14.95	6.86
G.323	44.28	15.42	6.83

DISCUSSION.

The conditions under which this trial was grown are normal for the Burdekin district, irrigation being carried out at regular intervals during the 14 months of growth.

The two varieties, 40 S.N.1133 and Q.57, have produced most cane and sugar, but the former of these showed a somewhat lower c.c.s. Q.57 has good tonnage as well as reasonably high c.c.s., and is most desirable from other considerations (*e.g.*, ease of harvesting). B.331, G.324 and G.208 have not produced as much cane or sugar as the first two, but the trial itself affords no conclusive evidence that they will not do so in the future. S.J.16, G.237, and G.323 have performed relatively poorly.

BUTT BROS., Oakenden.

Soil type: Grey sandy loam.

Nature of crop: Plant.

Age of crop: 16 months.

Harvested: September, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.50..	29.46	17.31	5.10
H.106	27.16	18.04	4.90
H.126	23.00	16.96	3.90
H.130	21.64	16.59	3.59
N.Co.310	21.03	17.83	3.75
H.143	16.91	17.09	2.89
H.185	14.43	17.81	2.57
H.117	12.93	16.47	2.13

DISCUSSION.

Soil moisture conditions were excellent at the time of planting this trial and afforded good opportunity to assess germinating capabilities. The strikes obtained were fair to good with the exception of H.117, which was rather poor, and H.130, which was slow in striking.

On the harvest results it is obvious that H.106 is the only one to approach the standard, Q.50, in yielding ability. The two mentioned are well ahead of all others in both cane and sugar production. H.126, H.130 and N.Co.310 have performed quite creditably though well behind the leaders. H.117, H.143 and H.185 have produced very small amounts of cane and sugar and there is very little likelihood of their being able to compete in plant crop with the best in this trial.

SUGAR EXPERIMENT STATION, Mackay, Block D2.

Soil type: Grey silt loam.

Nature of crop: Second ratoon.

Age of crop: 13 months.

Harvested: November-December, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Second ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.50	40.90	16.83	23.55	18.51	25.45	17.92	89.90	15.80
B.174	37.76	17.49	18.16	17.18	20.80	17.12	76.72	13.28
E.119	37.70	15.25	17.70	15.71	17.20	14.36	72.60	11.00
E.129	34.83	16.24	22.46	17.81	23.25	16.77	80.54	13.55
E.135	28.70	15.58	20.45	18.68	21.02	16.37	70.17	11.70
Q.47	26.47	16.21	17.70	16.84	17.30	14.51	61.47	9.79

DISCUSSION.

Not one of the new varieties in this trial has measured up to the standard set by Q.50, which has produced more cane, over the three crops, than any other by 13 tons per acre. This variety also equals the best of the trial in c.c.s. and therefore its sugar per acre is almost 2½ tons better than E.129, its

nearest rival. It would not be correct, however, on the result of the trial to say that none of the other varieties is worthy of consideration. E.129, Q.56 (B.174) and E.135 have all performed creditably and may prove better than Q.50 under circumstances more favourable to them. Neither Q.47 nor E.135 has produced sufficient to make it comparable with the other varieties.

R. YOUNG, Walkerston.

Soil type: Forest grey clay loam. **Nature of crop:** Plant.

Age of crop: 15 months. **Harvested:** November, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.50	44.78	14.58	6.53
I.162	43.98	17.28	7.60
I.126	43.79	17.08	7.48
I.120	42.99	14.38	6.18
I.P.184	41.96	13.01	5.46
I.106	34.79	18.37	6.39
I.150	27.01	18.59	5.02

DISCUSSION.

It was fortunately possible to irrigate the block containing this trial during the dry period at the end of 1951. Growth has been at times slow but nonetheless steady throughout.

Two varieties which have performed very well are I.162 and I.126, having produced higher sugar than Q.50 by almost 2 tons per acre. These three canes, *i.e.*, Q.50, I.106 and I.120, have performed reasonably well, but the yields of I.P.184 and I.150 are very low. However, because of their high c.c.s., I.106 and I.150 may justify further examination.

J. ANDERSON, Alloway, Bundaberg.

Soil type: Red forest sandy loam. **Nature of crop:** Plant.

Age of crop: 15 months. **Harvested:** December, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
H.25	32.48	13.76	4.47
H.19	30.86	13.97	4.31
H.84	28.66	13.47	3.86
Q.47	28.19	11.53	3.25
H.64	28.05	12.69	3.56
H.62	26.19	13.36	3.50

DISCUSSION.

Growing conditions were harsh for much of the early crop period, but growth was ultimately satisfactory and it is considered that final production figures indicate a sound performance by some of the varieties.

Unfortunately, the occurrence of unusually large variations in the plots of each variety has made it impossible to estimate with accuracy any differences between the varieties. A reasonable assumption is that H.25 and H.19 are slightly better than the rest in cane and sugar per acre, and also c.c.s. H.19 had shown the disadvantages of poor cover and growth cracks before it reached maturity, but these are not necessarily a complete bar to its commercial use. Of the others little that is definite can be said except that, on the basis of their performance under conditions which were harsh at times, they justify some further investigation.

BLACK BROS., Barolin Road, Bundaberg.

Soil type: Red sandy loam. **Nature of crop:** First ratoon.

Age of crop: 14 months. **Harvested:** December, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
H.18	23.68	14.91	30.25	15.54	53.93	8.23
N.Co.310 ..	21.48	17.78	30.39	14.74	51.87	8.30
H.52	19.93	13.70	34.63	15.45	54.56	8.08
Q.47	19.72	14.00	31.81	13.45	57.53	7.04
H.47	16.40	11.95	30.04	14.81	46.44	6.41
H.17	16.12	10.92	27.28	12.39	43.40	5.14

DISCUSSION.

Production on this trial block has improved considerably, by contrast with the plant crop, due to more regular irrigation. Growth has been more consistent and final yield much higher.

H.18 was most disappointing in the manner of its ratooning as it gave an incomplete stand and that very slowly. It will be recalled that this variety suffered most when the plant crop was frosted (the growing points being killed). It may be noted that N.Co.310 has dropped a full 3 units of c.c.s. below the plant crop. This is most likely due to the late harvesting of this early maturing variety.

H.52 has produced most cane and sugar in the ratoon crop due to a high tonnage and the second highest c.c.s. and, together with H.18 and N.Co.310 appears better than the standard Q.47. H.47 and H.17 have shown little distinction at any time during the year and have again produced the lowest tonnages and H.17 the lowest c.c.s.

A. G. HANSEN, Duncraggan Road, Bundaberg.

Soil type: Red volcanic loam. **Nature of crop:** Plant.

Age of crop: 12 months. **Harvested:** October, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
I.70	36.26	14.01	5.08
I.53	34.07	13.53	4.61
I.27	31.58	13.65	4.31
I.22	31.09	14.41	4.48
I.8	30.78	13.74	4.23
I.9	28.71	13.41	3.85
Q.47..	26.90	14.20	3.82
I.16	26.54	14.51	3.85
I.17	26.30	14.52	3.82
I.28	24.48	14.99	3.67

DISCUSSION.

The aim of the trial which was set out on this farm was to compare the usefulness of certain seedling varieties when grown under dry-farm conditions. The season was a reasonably good one for the purpose, for it has shown that all the varieties are able to withstand such dry conditions as occurred during the first five months after planting.

Judged on the joint basis of cane and sugar production the four varieties—I.22, I.27, I.53, I.70—have yielded best and are above the standard variety Q.47. I.16, I.17 and I.28 are low in tonnage but of sufficiently high c.c.s. to warrant further investigation. I.8 and I.9 were medium in both yield and c.c.s.; they showed greatest distress in the drought conditions but have recovered well.

I. P. WEBBER, Lover's Walk.

Soil type: Red forest sandy clay loam. **Nature of crop:** Plant.

Age of crop: 13 months. **Harvested:** September, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
H.4	48.70	14.21	6.92
H.6	43.54	16.79	7.31
H.45	41.44	16.89	7.00
H.42	41.24	15.45	6.37
H.20	40.29	16.41	6.61
Q.47	38.93	15.57	6.06

DISCUSSION.

The field containing this trial was irrigated throughout the year with the result that all canes grew rapidly and uniformly.

The three varieties, H.4, H.6 and H.45, each produced almost the same amount of sugar, but this was achieved in the variety H.4 only by the production of a much larger amount of cane—a shortcoming which is very likely to be repeated by it in future plantings. H.20, H.42 and Q.47 have either lower c.c.s., lower tonnage, or both, and are thus of less value than the first three. H.45 showed some growth cracks during its growth and also was the only one of the six in the trial to arrow. These disadvantages are not sufficient to exclude it from further trial.

D. E. REHBEIN, Duncraggan Road, Rubyanna.

Soil type: Red volcanic loam. **Nature of crop:** First ratoon.

Age of crop: 13 months. **Harvested:** October, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
H.20	13.77	13.58	28.67	13.15	42.44	5.64
H.45	13.42	15.05	26.67	14.29	40.09	5.83
H.19	11.61	12.58	26.25	13.22	37.86	4.93
H.25	9.58	12.84	29.42	13.36	39.00	5.16
H.64	8.22	14.48	22.25	14.38	30.47	4.39
H.42	7.94	16.25	25.92	14.12	33.86	4.95
H.62	7.90	14.18	27.67	12.83	35.57	4.67
H.46	7.85	14.65	23.50	14.55	31.35	4.57
Q.49	—	—	21.42	14.71	21.42	3.15

DISCUSSION.

All varieties recovered quite well from the extreme drought conditions suffered by the plant crop, but there is very great variation in the yields of all the sub-plots of the trial and, for this reason, no firm conclusion can be drawn regarding relative yielding abilities. However, it does appear likely that H.20 and H.45 would stand out—especially under harsh conditions. It is impossible, on the evidence of the trial, to decide which would be the better, and which the poorer, among the remainder.

It may be noted that three of these varieties, H.20, H.42 and H.45, produced much greater yields in the irrigated trial on Mr. Webber's farm previously described (page 152).

BROWN & ROBINSON, Maroochy River.

Soil type: Dark brown alluvial loam. **Nature of crop:** Plant.

Age of crop: 14 months. **Harvested:** November, 1952.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Co.331	62.35	8.81	5.49
C.P.29/116	55.85	12.05	6.73
F.25	50.05	12.89	6.45
F.60	47.45	13.32	6.32

DISCUSSION.

The result of this trial was affected by a hailstorm, which occurred during February of last year, severely damaging the two varieties F.25 and F.60, but having little effect on Co.331 and C.P.29/116.

Co.331 has produced more cane than any other variety, but had lowest c.c.s. and sugar per acre, and the evidence shows that this relative performance is likely to be repeated. The two seedling varieties have performed creditably, for the c.c.s. of each is high and it is probable that only the damage mentioned in the previous paragraph has caused the cane, and thus sugar, per acre to be slightly lower. It is possible that one of these two may compete with the standard C.P.29/116, which gave good tonnage but a slightly low c.c.s.

G. F. THOMASON, Bli Bli.

Soil type: Dark grey silty loam. **Nature of crop:** Second ratoon.

Age of crop: 11 months. **Harvested:** August, 1952.

SUMMARY OF CROP YIELDS

Variety	Plant crop		First ratoon crop		Second ratoon crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.50	36.71	15.03	35.77	13.92	39.82	13.64	112.30	15.93
Pindar	32.82	15.57	35.71	15.04	36.24	14.38	104.77	15.69
N.Co. 310	31.53	15.88	48.85	15.58	43.38	13.62	123.76	18.52
Q.47	29.94	14.51	38.30	13.92	40.56	12.01	108.80	14.62
C.P. 34/79	28.87	15.33	32.06	14.78	30.80	12.63	91.73	12.97

DISCUSSION.

The variety N.Co.310 has outstripped the others in this trial by a considerable margin in production of both cane and sugar—this is particularly noticeable in the ratoon crops.

Dry conditions which at times prevailed affected the growth of N.Co.310; however, it recovered very rapidly when good conditions returned; the ability to do this is a valuable property. Q.50 and Pindar produced the next greatest amounts of sugar and there is little to choose between the two. Q.47 produced good cane but of very low c.c.s. C.P.34/79 produced least of all over the three crops.

A Mercurial Dipping Plant

By G. BATES

The article by Mr. E. V. Humphry in the January, 1952, issue of the "Cane Growers' Quarterly Bulletin" inspired Mr. W. H. Crawford, of Brie Brie Estate, Mossman, to have constructed a somewhat similar outfit consisting of a cutting, dipping and bagging plant all in one unit. The machine works very satisfactorily, and

Fig. 66—A general view of the dipping plant on Brie Brie Estate.

Brie Brie Estate, which plants up to 100 acres per year, claims that with this unit and the drop planter the planting is as efficient and as fast as or faster than the cutter planter.

With this machine the plants are cut by a circular saw, dropped into a trough of mercurial solution and are picked up by a conveyor belt and dropped into a bag. The outfit is mounted on a chassis with two wheels and overall dimensions are approximately 15 feet in length and 5 feet wide. Power is supplied by a 3 h.p. engine running at 900 r.p.m. and the saw, which is an 18 inch peg-tooth type, travels at approximately the same speed. The trough into which the plants drop is 18 inches wide and holds 20 gallons of liquid, which has to be periodically replenished. Over a season's planting allowing for wastage, etc., the expenditure of Aretan amounted to less than ½ lb. per acre planted, when used at the concentration of 1 lb. to 20 gallons. The trough is completely cleaned out at least once per week.

The conveyor belt is 18 inches wide and provision is made for adjustment to take up slack. The speed of the shaft carrying this belt is approximately 40 revs. per minute. The working team consists of four men, one on the saw, one handing up bundles of cane, and two on the bagging end. This team can handle up to 40 bags per hour, but as the plants drop into the bags without packing this is equal to approximately 32 hand filled bags.

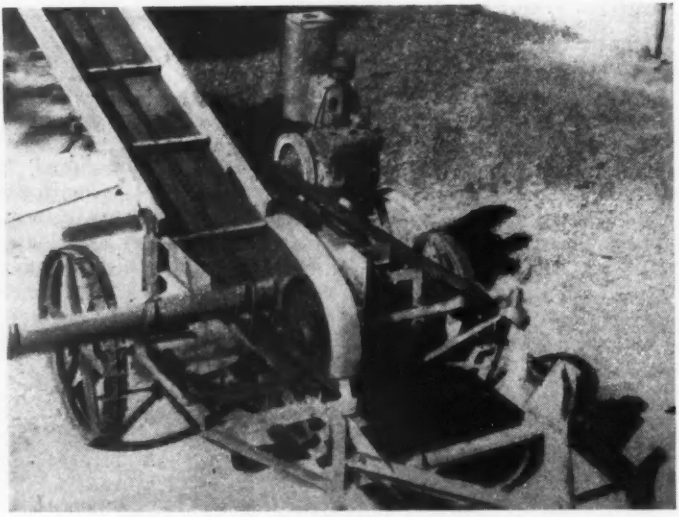

Fig. 67—Showing conveyor belt.

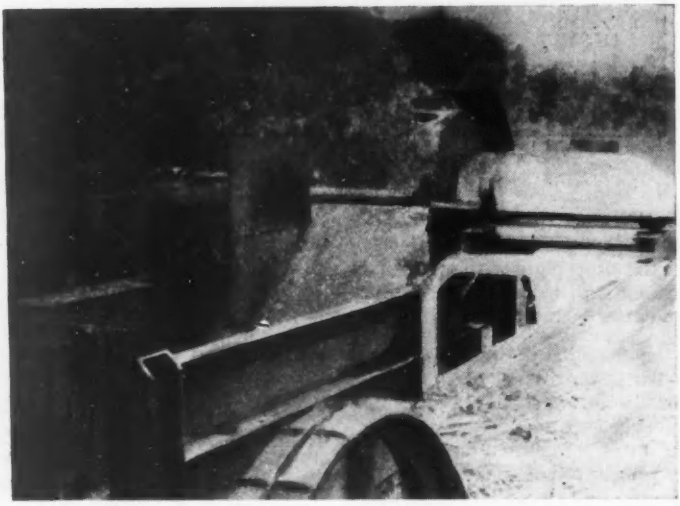

Fig. 68—Showing circular saw. Note baffle plate to regulate length of plants.

The outfit is transported by an Farmall A.V. tractor and when set up for operation the whole outfit is made level by adjustment of the hydraulic lift of the tractor.

The cost of material and parts without the engine is approximately £80. The motor costs in the vicinity of £100 and labour costs for assembling would be extra.

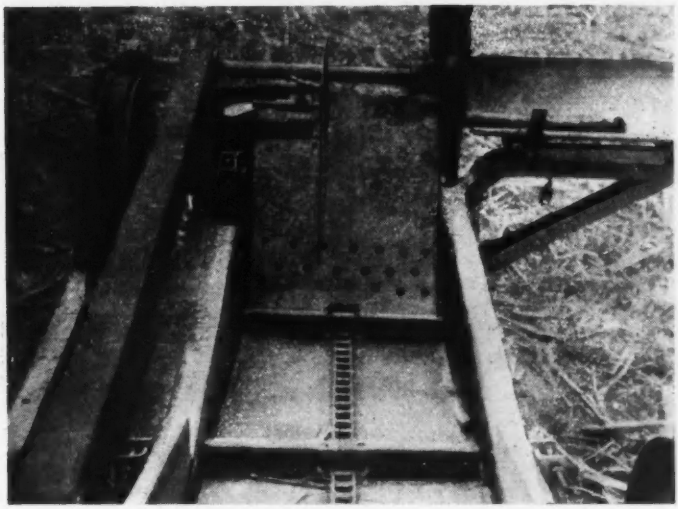

Fig. 69—Showing trough for mercurial solution.

Blind Canes

By J. H. BUZACOTT

It is not at all uncommon when cutting plants of Q.44 to find that the top sections of the stalk have produced no eyes. Usually only two or three of the nodes on each stalk are affected in this way whilst the buds are perfectly normal below the portion involved. At times it can also be seen that after a few blind nodes, normal buds are again produced on the topmost sections of the stick.

An investigation of this phenomenon reveals that the non-formation of eyes occurs at the period when the variety normally arrows. Arrowing represents a change from the vegetative phase to the reproductive phase and during the period at which a cane is flowering it does not produce buds. After arrowing vegetative growth from the growing point ceases and any further growth must occur as side-shoots from the buds. In the youngest nodes when a flower is produced no buds are developed, but these budless nodes are situated at the tip of the stalk where they are relatively inconspicuous. It is not necessary for the cane to arrow for budless nodes to occur. A few varieties like Q.44 often commence to arrow and then change their mind, as it were, and go on growing. In such instances nodes which are produced at the period when the cane was

about to arrow are budless, but as soon as the stalk reverts to the vegetative phase normal buds are formed. It is apparent, therefore, that the change in physiological processes associated with flowering has partly occurred but these processes have been interrupted before fulfilment. They have proceeded far enough for the inhibition of bud formation, but not for the production of the flower.

In addition to Q.44 this phenomenon is quite common in Oramboo and H.109, two varieties formerly grown commercially in Queensland. It is also sometimes seen in seedling canes. Recently G.218, a Q.27 × Badila seedling, was found with over half the upper portion of the stalk eyeless. Where standover crops are grown it is possible to have two budless sections of the stalk corresponding with the two arrowing periods which may have occurred during the life of the crop but during which the particular stalks affected failed to arrow.

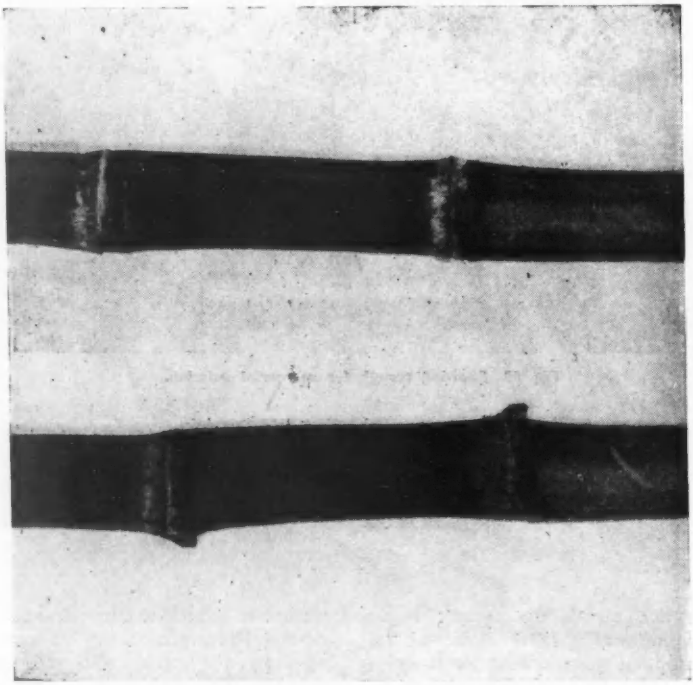

Fig. 70—Two sets of seedling G218, the top one is completely without buds and the bottom one has buds normally developed.

Q.44 is a variety which normally arrows in June or July. In some years, however, late arrows are formed and in 1952 a Q.44 arrow was observed as late as November; arrows from this variety are quite common in September. With these delayed arrows it is possible to have an eyeless section on the stalk corresponding with the normal June arrowing period when the particular stalk " changed its mind " and did not arrow. This is followed by a section of nodes with normal eyes and then by the arrowed tip. Such a condition only occurs with stalks which have arrowed later than the normal period for the variety and usually stalks with blind sections are without arrows.

Whilst the lack of buds has little economic significance it has been a source of trouble to some farmers, particularly in Q.44. These farmers, who have not carefully inspected their seed cane, have planted whole sticks from a crop in which a high percentage of the stalks show the peculiarity. Up to a ten per cent. loss in germination could easily occur from this cause and it is a further reason for farmers to closely inspect their sources of seed cane before cutting plants. In these days of cutter-planters the condition is much more likely to pass unnoticed than when the sticks were normally cut into setts for drop-planters.

The accompanying picture (Fig. 70) shows portion of two setts of G.218, the top one being completely without buds and the bottom one with a normal development of them.

Types of Badila*

By J. H. BUZACOTT

Introduction.

Badila was introduced into Queensland in 1895 and from its first release it proved an outstanding variety in North Queensland, so much so that even after 56 years it still accounted for some 16 per cent. of the total Queensland cane crop. Most, if not all, varieties of sugar cane throw "sports" which are simply sticks in the cells of which a slight difference in the chromosome structure has occurred. Usually sports are not very common but they are nevertheless well known to farmers as evidenced by varieties like Clark's Seedling which has several recognised sports such as Benbow, P.Q.1, and Gaspari Seedling which have all been grown commercially. Clark's Seedling has had a commercial life of almost 50 years and naturally the longer a cane variety has been in existence the more likelihood there is of sports having been selected and propagated as such. In New Guinea the natives are particularly keen on the type of sport known as a "colour sport." They invariably propagate striped or different coloured sticks which appear in a stool of cane and they recognise the fact that they are still dealing with merely a special form of the same variety. Instead of giving these sports a new name the natives use the name of the variety from which the sport arose and couple it with a term denoting its colour, *e.g.*, in the Chimbu district "kama" appertains to black (or very dark purple) sports, whilst "munonbokwa" denotes striped ones. Thus a common variety called Kimigl in the Chimbu district is a reddish brown in colour. A black sport known as Kimigl kama and a striped one called Kimigl munonbokwa are both common.

More than one type of Badila has been recognised for many years. "Oba" Badila is referred to by Easterby [1] who, however, states that "this cane is considered to be identical with the original N.G. 15 or Badila but is a new introduction from New Guinea." Another variety has been known as Tableland Badila, although this term may refer to the variety which was officially designated as Badila Seedling in 1940. It is, however, more probably only normal Badila which has been grown on the Atherton Tableland for some years and brought back to the coast. This has been done on a number of separate occasions and on at least one occasion, under the supervision of the Bureau of Sugar Experiment Stations, the Cairns Canegrowers'.

---

* Paper presented at Innisfail Conference, Q.S.S.C.T., March, 1953.

Association established Badila plots at Lake Barrine and Malanda. The planting of Badila on the Tableland seems to have had a beneficial effect on the plants since they appear to produce better crops when reintroduced to coastal areas. It has been considered that this was possibly due to the elimination of certain diseases by planting in a cold climate, but this has never been proved beyond reasonable doubt. A further type of Badila appeared a few years ago in the Innisfail district and shortly afterwards in the Cairns district. Due to its greater size of barrel it has become known as "Thick" Badila. In the Burdekin district two types of Badila have been recognised by farmers and known respectively as "Black" Badila and "Oba" Badila, but whether the latter is identical with the original Oba Badila is not known.

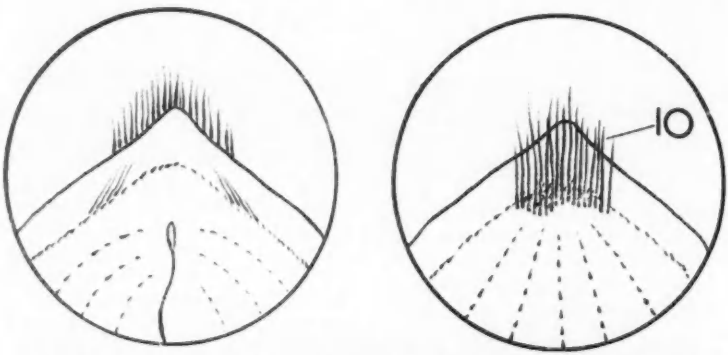

Fig. 71—Showing the bud-tip of Badila—(left) anterior and (right) posterior view.

Collection of Varieties.

Badila is normally a sparse arrower and to ensure sufficient arrows for cross-pollination work it would be necessary to maintain a large area of land planted with the variety. It has, therefore, been customary at cross-pollination time to explore the blocks of Badila growing on farms in areas such as Freshwater and Babinda where canes arrow freely. In this way sufficient arrows can be obtained for the desired crosses. Some 16 or more years ago it was noted that these Badila arrows appeared almost entirely in stools in which the stalks were more elongated than those of non-arrowed stools in the field. At first this was thought to be a peculiarity associated with arrowing, but it was soon realised that this cane which arrowed was a variety with slight differences from ordinary Badila. In the Babinda and Innisfail districts whole fields of this thinner variety of Badila which had longer internodes and was freer arrowing, began to appear. At this particular time outbreaks of gumming disease occurred in the far northern districts. The reaction of genuine Badila to gumming disease was well known, but the reaction of the thinner arrowing type was not; nor was it known with any certainty whether it was even Badila. In 1937 the system of approved varieties was introduced. Under the terms of the Sugar Experiment Stations Act it became necessary for farmers to eliminate any varieties from their farms unless they appeared on the approved lists. As the thin Badila obviously was different from Badila and maintained its difference when planted out the Bureau decided to run the thin Badila through disease trials and if its reactions were satisfactory then to approve it for planting in those areas where Badila was approved. This solved an awkward problem and the variety having passed its disease trials, was given the name "Badila Seedling" and added to the list

of approved varieties for the districts from Tully north. All evidence seems to indicate that this so-called " Badila Seedling " is not a seedling of Badila but a mutation or sport of that variety. It certainly does not differ from Badila to the same degree that other known Badila seedlings such as S.J.2, S.J.4, S.J.7, S.J.16 and Cato do. It is also most unlikely that it is a variety which was given out by the Acclimatisation Gardens some 40 years ago under the name Badila Seedling and which apparently was a seedling from Badila.

Owing to the further confusion developing through the advent of Thick Badila in the Cairns and Innisfail districts and Oba Badila in the Burdekin district, the Bureau, during 1951, had its officers in all Northern districts make a collection of any varieties of Badila, including ordinary Badila, and to despatch setts to the Meringa Experiment Station for propagation and examination. This was done and duplicate plantings were subsequently made on the Experiment Station and at Freshwater. The descriptions which follow are the result of the examination of the plant crop of this collection.

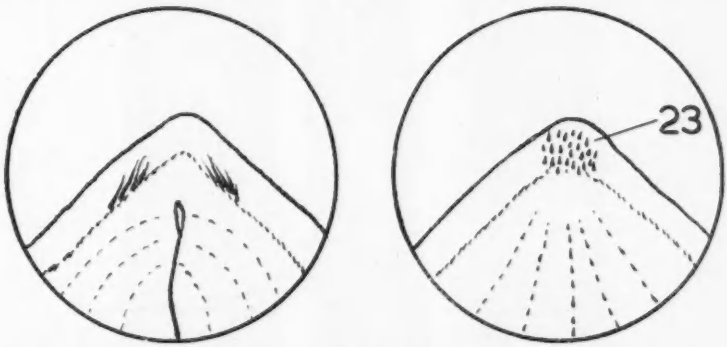

Fig. 72—Showing the bud-tip of Badila Seedling—(left) anterior and (right) posterior view.

Genuine Badila.

After 50 years it is not easy to tell which particular variety is the original Badila introduced by Henry Tryon, nor is it possible to say whether two subsequent introductions from New Guinea were identical with Tryon's introduction or not. However, the variety which is now regarded as the genuine Badila, from which the others are probably bud sports, is a thick very dark purple cane with short and somewhat irregular internodes. It has broad drooping leaves, stools well and produces good crops in medium to good soil types. Its chief distinguishing feature from the other types is the development of a long group of hairs on the posterior side of the tip of the prophyllum of the bud (see Fig. 71—right). This group, which is No. 10 of the Jeswiet system, is long enough to be easily visible above the bud when viewed from the front without detaching the bud from the stalk (see Fig. 71—left). Unfortunately this hair group is deciduous and is accordingly often hard to find. In the writer's experience it is most easily found in cane stalks from six to twelve months of age. In older stalks it has often disappeared, although a close search will generally reveal at least a few buds showing the character. Collections of this type from Hambledon, Mulgrave, Babinda and Innisfail mill areas show no discernible differences.

Badila Seedling.

As mentioned earlier, this variety is almost certainly a sport of Badila and not a seedling from it. It is thinner with much longer internodes (see Fig. 73—centre) and arrows much more freely

than Badila. Investigations over the last few years show that most blocks of genuine Badila in the Cairns and Innisfail districts contain varying percentages of Badila Seedling. In the Babinda area many farmers grow it in pure stands and particularly on the poorer wet soils of the eastern side of the railway line there is some evidence that it may give better crops than Badila. It certainly lodges more easily and germinates more slowly than ordinary Badila. Badila Seedling in a growing crop is not difficult to distinguish from genuine Badila, but it is not easy to select a reliable distinctive character with which to effect the separation of the two varieties. The principal difference which the writer has been able to find is that hair group No. 10 of the prophyllum of the bud of Badila Seedling is never strongly developed whereas in Badila it is strongly developed although deciduous. The group of short hairs, No.23 (see Fig. 72—right) in approximately the same position as No. 10 is present in Badila Seedling, whilst in Badila this group is obscured by the very much larger No. 10 group.

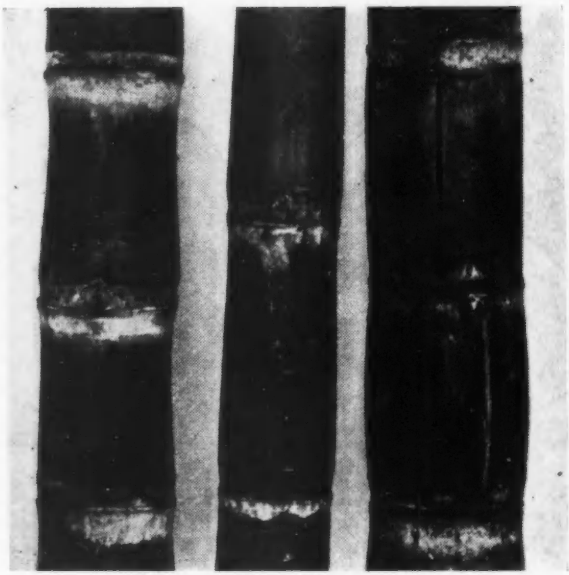

Fig. 73—Showing (from left) ordinary Badila, Badila Seedling and Thick Badila.

Thick Badila.

The variety now called Thick Badila has undoubtedly been known to farmers in the Innisfail district for a number of years. More recently it has come into prominence through being propagated in the Cairns district until fields of this variety, more or less without admixture of other Badila varieties, now exist. Thick Badila is somewhat thicker, more oval in cross section, more heavily waxed and more barrel-shaped than ordinary Badila. It always has very large growth cracks, often two or more to an internode (see Fig. 73—right). It is relatively easy to distinguish from other types of Badila by the fact that one or more of the oldest untrashed internodes has strongly defined vertical

dark red stripes on a cream coloured background (see Fig. 74—right). Corresponding internodes on other varieties of Badila are either cream or cream with a reddish blush but without the dark vertical stripes (see Fig. 74—left). Under good growing conditions Thick Badila develops sticks of very large diameter and some farmers have recently become interested in its propagation in the hope that it may produce heavy crops on first-class land without lodging. Odd stools of Thick Badila can be found in many blocks of Badila in the Cairns and Innisfail districts. Since it shows several points of difference from ordinary Badila it is a matter of conjecture whether it was originally a sport.

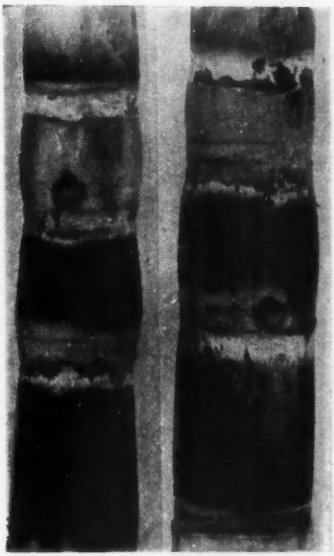

Fig. 74—Showing (left) ordinary Badila and (right) Thick Badila.

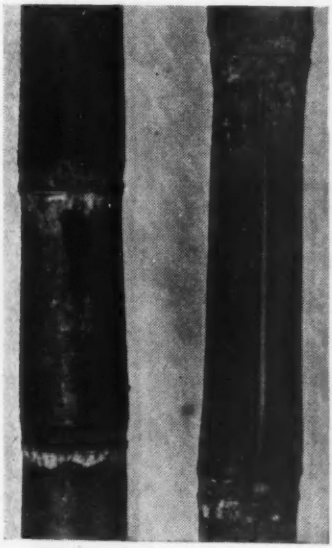

Fig. 75—Showing (left) Badila Seedling and (right) Oba Badila.

Oba Badila.

As used here the term Oba Badila is taken to refer to the variety of Badila grown at the present time in the Burdekin district under that name. The original Oba Badila was the name given to the variety 14 N.G.188 which was introduced under the name Oba by the 1914 New Guinea Expedition of the Colonial Sugar Refining Co. Ltd. It was thought at the time that this variety was identical with the original Badila introduced by the Department of Agriculture in 1895. The descriptions of cane varieties introduced by the early expeditions were too sketchy to be of much value for identification purposes and it will possibly never be known whether these two New Guinea introductions were identical. After its introduction in 1914, Oba was grown under the name Oba Badila for some years, but its ultimate fate and whether it has continued its propagation is not known. It is not impossible that the variety still grown in the Burdekin district as Oba Badila is the one introduced in 1914.

Oba Badila as now grown has longer internodes than Badila and is somewhat thinner. It bears a strong resemblance to Badila Seedling although in the

Meringa planting it showed greater vigour than that variety and developed bad growth cracks (see Fig. 75—right). Its buds were more prominent than those of any of the other Badilas represented in the plot.

Black Badila.

Black Badila was received from the Burdekin district and in the Meringa planting showed a great deal more vigour than the other Badilas with the exception of Oba Badila. The stalk shape conformed to that of ordinary Badila, but apart from a defined wax band there was less wax on the internode than on that of Badila. Due no doubt to this lack of wax the stalks presented a very dark purple-black, polished appearance, which has probably given rise to the local name of Black Badila. This glossy effect is quite noticeable in Fig. 76 (centre) in which Black Badila is compared with normal Badila (left) and Thick Badila (right). It should be noted that the stick of Black Badila shown in the picture is thinner than usual and a normal stick would be the same thickness as the genuine Badila on the left of the picture. Hair group No. 10 is present on the prophyllum of the bud but does not appear to be as well developed as it is in Badila, although more strongly developed than in Badila Seedling.

Striped Badila.

Among the cane received from the Burdekin as Black Badila there must have been still another sport since some of the stools which grew were characteristically different. Instead of being self-coloured the stalks are a dark red colour with longitudinal black stripes. These stripes are not easily observed but are quite obvious when viewed in the sunlight and, strangely enough they do not appear on the young untrashed internode as they do in Thick Badila. The sticks of this variety are glossy like those of Black Badila and it is undoubtedly a colour

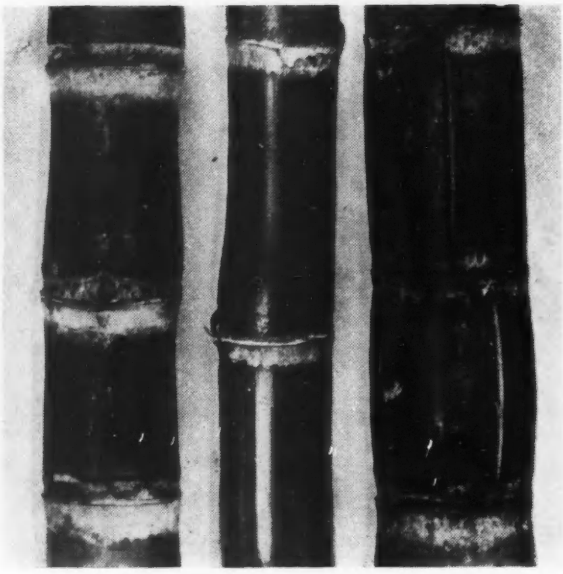

Fig. 76—Showing (from left) ordinary Badila, Ayr Badila, and Thick Badila.

sport of that variety. The officer who selected the Black Badila cane setts for despatch to Meringa was probably unaware of the presence of the sport, and indeed there may have been only one stick in the stool from which the plants were cut. It was unfortunately not possible to show the stripes on this variety in a photograph since there is insufficient contrast between the black of the stripes and the dark red body colour.

Conclusion.

The six possible varieties of Badila described differ relatively little from genuine Badila, although Thick Badila shows at least three distinct points of difference. First sports rarely differ in more than one obvious character from the original plant, but in the case of a variety such as Badila which has been grown on a large scale for over 50 years each sport could have again mutated several times and therefore varieties differing in a number of characters could easily arise during that long period. The writer believes that most if not all of these varieties described are sports of Badila, but the large number of Badila seedlings which have been produced by various cane breeding organizations since 1900 and the relatively lax control over the distribution of cane varieties prior to 1937 render it impossible to state dogmatically that all these varieties are bud sports.

The attempted identification of a number of different probable sports of a single variety is not an easy task. The varieties dealt with here, although identified from sticks growing side by side on the same block of land, were planted from different sources of planting material. Differences in vigour arising from this cause can produce marked morphological differences in sugar cane; consequently it is doubtful whether any reliable empirical means of identification of the various types of Badila could be worked out until several plantings have been made using setts from the same source. The second planting at Freshwater and Meringa has now been established and observations will be carried out on the resultant crop in 1953. This paper can accordingly be regarded more or less as a preliminary discourse on the types of Badila which are known to exist in plantings at the present time. It is still possible, however, that in addition to the types described here others are being grown. If so it is hoped that they will be brought to the notice of officers of the Bureau so that they may be added to the assortment already collected. Badila, which has been the doyen of all cane varieties for so long, is unfortunately fast losing its pride of place and in 1953 it will have fallen to fourth position or even lower in the State ranking. It must, however, continue to provide an important quota of the northern crop for many years to come and it is hoped to gather some information regarding the relative yielding capacity of the different varieties of it during the next two or three years.

REFERENCE

[1] **Easterby, H. T.:** 1926. "Varieties of Sugar Cane in Queensland." Bulletin No. 2, Bureau of Sugar Experiment Stations.

Soil Conditioners and Other Modern Chemicals*

THEIR VALUE TO THE SUGAR INDUSTRY

By L. G. VALLANCE

Sugar manufactured from the cane crop just harvested will be worth somewhere in the vicinity of forty million pounds. This is a sizeable industry and, as one might expect, a good deal of thought and research goes into maintaining it at a high peak of efficiency.

Possibly the most remarkable of the improvements have been made on the primary side, *i.e.*, with regard to the output of the individual farm. In this respect the breeding of better cane varieties, disease and insect control and the application of fertilizers have all played their part. The aid of many branches of science has been called upon and the botanist, the pathologist, the entomologist and the chemist have provided invaluable assistance. In the early days, perhaps the chemist had the hardest row to hoe, because of a natural dislike on the part of the farmer to the very word "chemical." He regarded it with suspicion, as something that was not natural; with fertilizers, for instance, he preferred something that had been alive, such as blood and bone.

However, the chemist refused to believe that his science was unnatural and persisted in making available such substances as sulphate of ammonia, superphosphate and muriate of potash. Moreover, he made them available in vast quantities and at a price the grower could pay. The use of these chemical fertilizers has now been routine practice for 30 or 40 years, and their value is so well established that no one to-day questions their "naturalness."

In round figures, I would estimate that the yearly cost of fertilizer used by the sugar industry has latterly reached the high figure of about two million pounds. Used correctly, years of experience indicates that these chemicals do not harm the soil. Why should they, when the elements they supply (nitrogen, phosphoric acid and potassium) are natural plant foods and just as much a part of nature as water and air?

However, chemical fertilizers have now for some time been relegated to the commonplace, and the chemist rather lost his place in the sun for a while. Then came World War II with its demand for chemicals, all kinds of chemicals, and in a hurry. Factories mushroomed, expanded and expanded again. Chemicals for maintaining food supplies were high in the priority list and in England intensive efforts were made to find substitutes for insecticides no longer available. The effects of thousands of substances were investigated and amongst these was the gamma isomer of *benzene hexachloride*

For years, the greyback grub had attacked the roots of the cane plant i tropical districts. It devastated whole farms and in some years losses were estimated at over 100,000 tons of cane. Benzene hexachloride was the complete answer. Properly applied, it will give 100 per cent. protection from the grub and to-day thousands of acres are treated with this chemical each year.

Following hard on the heels of benzene hexachloride the chemist pre sented the cane farmer with a group *mercury* compounds which are of gre assistance in establishing a new plan ing of cane. As might be expected, difficult period in the life cycle of cane plant is its beginning. To encourage a tiny bud planted in the soil to com- mence growth and maintain

* An A.B.C. Broadcast.

existence calls for a reasonably favourable environment. With mass plantings of large acreages to cope with, a farmer cannot always wait for or provide ideal soil and climatic conditions. In addition, certain micro-organisms living within the soil will attack the planted sett and may completely prevent germination, particularly when conditions are unfavourable for quick and vigorous growth.

The dipping or spraying of cane setts with solutions containing compounds of mercury ensures germination under all but the most unfavourable circumstances and is now routine practice for many farmers over the entire sugar area from North to South. The result is a vast saving of the labour and money which were frequently involved in the replanting of many acres.

The grower is also rapidly acquiring familiarity with substances such as *2,4-di-chloro-phenoxy-acetic acid* and *penta-chlor-phenates*. In areas suitable for their use these chemicals are weed-killers that the farmer must once have dreamed about. Weed-killers which, when simply sprayed on the ground, prevent the growth of weeds and grasses.

Unfortunately their usage is not yet fool-proof and it is sometimes difficult to provide field conditions just right for their successful application. Nevertheless, many farmers are now finding them a most economical and useful part of their farm management.

And now we come to the latest production of the chemist, and to my mind the most intriguing of them all—the *Soil Conditioner*. Whether this group of chemicals will ever be as valuable to the cane farmer as the others is, as yet, impossible to tell, nor do we know whether usage on a farm scale will be an economic proposition, but they certainly have most attractive possibilities.

A soil conditioner is not a fertilizer, *i.e.*, it does not supply the food elements necessary for the growth of the plant. Its effect is to improve the physical condition or tilth of the soil. Soils which have a tendency to set or become lumpy and are very difficult to cultivate may be transformed to a friable, loamy condition by the application of these chemicals. All of us, whether we are farmers or home gardeners, are familiar with harsh types of soil which do not respond to normal cultivation.

For many years, indeed centuries, farmers have striven to maintain the fertility of their soils, but one of their greatest difficulties was to overcome the deterioration of its physical structure which so often occurred with continuous working. Farmyard manure and other organic matter have been used with a considerable amount of success, particularly in the colder countries. However, in tropical areas of heavy rainfall and high temperatures organic matter is very quickly decomposed and lost. It is a very difficult matter to maintain an adequate supply to large acreages.

Research workers were curious to know just why organic matter was so beneficial. For a long time Nature guarded her secret very carefully and little or no progress was made. Gradually, however, work began to centre around certain chemicals which were formed during the decomposition of organic material by micro-organisms. This proved a most fruitful field for research and chemists ultimately found that a series of substances resembling polysaccharides were basically responsible for improving and maintaining soil structure.

The next step was to ascertain whether materials having a similar effect could be produced synthetically. Attempts in this direction were marked with a great deal of success and the large industrial chemical concerns in America were able to synthesise substances which reproduced the beneficial effect associated with decomposing organic matter. Because of their ability to co-agulate the clay particles of the soils and form them into small lumps or granules these soil conditioners have a most profound effect on tilth and in

some cases will transform a sticky clayey soil into one with a nice loamy texture. The advantages of this from a farmer's or horticulturist's point of view are obvious.

Through the courtesy of the Monsanto Chemical Co. we have been able to set out in the laboratory and the field a series of tests with " Krilium "—a well known soil conditioner made by that company. It has been found that on many of our Queensland sugar cane soils, Krilium has a very beneficial and almost spectacular effect. On others the improvement is not so marked. Efforts are being made to manufacture this material and place it on the market at a price which makes its usage economically possible. It is to be sincerely hoped that this can be successfully accomplished since undoubtedly the soil conditioner is something for which the farmer has been waiting for many, many years.

And now in conclusion, let me stress the necessity for a commonsense approach to the use of these chemicals. The time has not yet arrived when we can throw a handful of synthetic materials on the soil and merely sit back and await results. Modern science has produced an adjunct to good husbandry and not a substitute.

Velvet Bean Seed Supplies

Velvet beans have become the most favoured green manure crop in practically all sugar producing districts from Mossman to the South. During 1952 the demand for seed far exceeded the available supply, and many growers were compelled to substitute less satisfactory cowpeas of various kinds or to leave the land under bare fallow. The major seed supplies of velvet beans came from the Atherton Tableland and from the Childers district, but they were quite inadequate for the plantings required.

For several years the Bureau has attempted to interest seed growers in this relatively new crop, but there has been a marked lack of interest in changing from Poona and other cowpeas to the type the industry requires. It does not appear at the present time that next year's seed supplies will be any better than in 1951.

Childers cane growers have demonstrated that the growing of velvet bean seed can be a profitable enterprise and that the returns are well worth while. Where spring planting is practised the fallow land can grow a velvet bean crop to maturity, the seed pods can be gathered and the crop still ploughed into the soil.

Indications are that if the sugar industry requires adequate supplies of velvet bean seed it would be well advised to consider producing its own supplies. All sugar districts South of Townsville would be suitable for seed production except such parts of South Queensland where early frosts are likely to kill the plants before seed matures.

Planted at the normal time in early summer velvet beans produce a heavy mass of foliage which makes pod gathering somewhat difficult. If planted at the end of the wet season, however—say late March or early April—the plants will produce little foliage but will develop seed pods which can be readily collected.

Velvet beans possess a tough, leathery pod which must be dried out thoroughly before it can be shattered. This can be done on sheets of iron in the sun. The four Sugar Experiment Stations in Queensland at Gordonvale, Ayr, Mackay and Bundaberg have found that this crop is the most successful one under their widely varying conditions, and the Bureau each year produces its own seed supplies on two of these Stations. The crop withstands both drought and very wet conditions and is not affected by bean fly or wilt. Adequate land is available in many mill areas for plantings to be made for seed supplies and other individual or co-operative effort would very soon assure cane growers of adequate seed supplies each year.

For those who may be interested, a description of a simply constructed seed sheller can be forwarded on request.

N.J.K.